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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/008,623	12/06/2001	Malcolm R. Schuler	3016664 (17732.6310.003)	3753

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HISCOCK & BARCLAY, LLP
2000 HSBC PLAZA
100 Chestnut Street
ROCHESTER, NY 14604-2404

EXAMINER	
MARKOFF, ALEXANDER	

ART UNIT	PAPER NUMBER
1746	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/008,623	SCHULER ET AL.	
	Examiner	Art Unit	
	Alexander Markoff	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13,14 and 27-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13,14 and 27-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Interpretation

1. It is noted that the claims use the term "megasonic waves" and state "each of the megasonic waves is generated by a piezoelectric transducer". It is noted that the specification does not describe singular megasonic waves. The specification uses the term columns of megasonic energy. But it is not what is claimed. Thereby, the broadest interpretations of the claims does not require two transducers because a single transducers produces plurality of waves.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 13, 14 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Shwartzman et al (US Patent 4,118,649).

Shwartzman et al teach a method as claimed. See at least column 1, lines 35-56 of '649 and Figures 1, 2 and column 4, lines 24-48 of '869.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 13, 14 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shwartzman et al (US Patent 4,118,649).

Shwartzman et al teach a method as claimed except for specific recitation of the orientation of the short and long sides of the transducers. See entire document especially column 1, lines 35-56, column 2, lines 24-30, column 3, lines 28-49.

However, since, the document recites rectangular transducers and do not require a specific orientation of the sides any of the possible orientations is encompassed by the document. Moreover, the document teaches that the transducers should be closed packed to each other.

It would have been obvious to an ordinary artisan at the time the invention was made that close packing of the rectangular transducers in a rectangular assembly would require side by side placement of the transducers with the sides parallel to the sides of the assembly.

Thus, it would have been obvious to an ordinary artisan at the time the invention was made to place the rectangular transducers of Shwartzman et al in the rectangular assembly of Shwartzman et al with the short sides of the transducers parallel to any of two sides of the assembly. Thus, the limitation of claims 13 and 14 would be met by either of such positions, and the limitation of claim 27 would be met by one of the two of the positions.

It is noted, that no unexpected results was achieved by the specific orientation of the sides of the transducer in the rectangular assembly disclosed by the instant application.

8. Claims 13-14 and 28 are rejected under under 35 U.S.C. 103(a) as obvious over Stanasolovich et al (US Patent No 5,533,540) in view of Bran (US Patent NO 4,804,007).

Stanosolovich et al teach a method as claimed except for specific recitation of proportions of the sides of the upper surface of the transducers. See at least Figure 1 and the related description.

Stanosolovich et al teach cleaning of the plurality of the wafers placed in boats or holders. Such boats or holders are conventionally longer than a diameter of the wafer. See Bran as evidence of such and one of the conventional orientation of the wafers with respect to the sides of the transducers (Figures 1 and 2 and the related description).

It would have been obvious to an ordinary artisan to provide transducers in the conventional apparatuses disclosed by Stanosolovich et al comparable with the lengths of the conventional wafer holder or boat to ensure the treatment of all wafers equally and to use such in the methods of disclosed by Stanosolovich et al. The methods utilizing such would meet the claimed limitations.

9. Claims 13-14 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al (US Patent No 6,085,764) in view of Handbook of Semiconductor Wafer Cleaning Technology (HSWCT) and Shwartzman et al and Bran.

Kobayashi et al teaches a method as claimed except for the use of megasonic frequency and specifying the proportions of the dimensions of the transducer. See entire document, especially Fig. 1 and Description of the Preferred Embodiment. The movement of the wafers relative to the wafers in Kobayashi et al is the same as the movement of the wafers shown on Figs. 1 and 2 of the instant application.

Kobayashi et al teach the use of ultrasonic cavitation for cleaning.

The HSWCT teaches (page 141) that ultrasonic cavitation can cause a surface damage. The document recommends the use of megasonic waves produced by arrays of megasonic transducers to avoid the surface damage.

It would have been obvious to an ordinary artisan at the time the invention was made to use an array of megasonic transducers instead of the ultrasonic vibrator 12 in the method of Kobayashi et al in order to prevent damage from ultrasonic cavitation with reasonable expectation of success because the HSWCT recommends that.

As to the proportions of the edges of the surface of the transducer: Kobayashi et al does not specify the shape or proportions for the transducer. It would have been obvious to an ordinary artisan at the time the invention was made to use a transducers with any suitable shape and proportions, which would ensure adequate cleaning results with reasonable expectation of success.

Shwartzman et al and Bran teach that rectangular transducers were conventional in the art of the semiconductor wafer cleaning.

It would have been obvious to an ordinary artisan at the time the invention was made to use a conventional rectangular transducers in Kobayashi et al with reasonable expectation of success. It would also have been obvious to an ordinary artisan to place the rectangular transducers parallel to the sides of the bath of Kobayashi et al in order to simplify the mounting and construction and since Bran shows such as conventional.

Thus the claimed limitations would be met by one of the two obvious positions of the transducers.

It is noted that no unexpected results were achieved by the use of the claimed proportions of the transducer.

10. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shwartzman et al (US Patents No 4,118,649) as it applied to claims 13 and 27 above, further in view of Kobayashi et al (US Patent No 6,085,764).

Scwartzman et al do not teach the use of transducers placed at the bottom of the tank.

However, such was conventional in the art as evidenced by Kobayashi et al.

It would have been obvious to an ordinary artisan at the time the invention was made to place the transducers of Shwartzman et al at the bottom of the treatment tank in order to simplify the construction of the apparatus and manipulating the wafers with reasonable expectation of adequate results because Kobayshi et al teach such as conventional in the methods for treatment wafers.

Response to Arguments

11. Applicant's arguments with respect to claims 13, 14, and 27-29 have been considered but are moot in view of the new ground(s) of rejection.

It is noted that the applicants amended the claims and argue that the previously applied rejections are not proper. The amended claims are addressed in the rejections above.

It is also noted that the applicants argue that the shape of the transducer and the movement of the wafers parallel to the short side of the transducer is significant.

This is not persuasive because the rectangular shape is conventional and no unexpected results were achieved by the referenced movement.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Markoff whose telephone number is 571-272-1304. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alexander Markoff
Primary Examiner
Art Unit 1746

AM

ALEXANDER MARKOFF
PRIMARY EXAMINER